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BAMBOO FIBERS AND PREPARATION METHOD THEREOF
[Zhu xian wei ji qi zhi zao fang fa]

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Claims

1. A bamboo fiber used as raw material for building materials, characterized in that it is a pure and natural crude bamboo fiber having a diameter of 0.04 to 0.5 mm and length greater than 10 mm that does not contain chemical reagents.

2. A method for preparing bamboo fiber according to Claim 1, composed of an industrial process for preprocessing bamboo raw material, a bamboo fiber preparation industrial process, and a bamboo fiber post-processing industrial process, characterized in that the bamboo fiber preparation industrial process is composed, of in sequence, cold roll compacting, water boiling and soaking, dehydration, carding of the fiber, and various industrial processes.

3. A bamboo fiber preparation method according to Claim 2, characterized in that the cold roll compacting industrial process uses a cold rolling mill on bamboo splints that were processed thoroughly in the industrial raw material preprocessing process, then the cold rolling mill compacts them to form thin bamboo splints with the water removed; the water boiling and soaking industrial process takes thin bamboo splints after they have undergone cold-roll compacting, and boils and soaks them in water at $100^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for at least 20 min to perform sugar removal, fat removal, and sterilization to convert them into bamboo fiber; the industrial dehydration process consists of mechanical dehydration and drying of the bamboo that has been boiled and soaked and formed into fiber; the industrial process for fiber carding takes bamboo fiber that has undergone the industrial dehydration process and uses a fiber destruction machine for carding into bamboo fiber threads.

The present method pertains to a bamboo fiber product and its preparation method; precisely speaking, it is an industrial method for preparing a natural bamboo fiber product using clump bamboo, which has a short regeneration cycle and reproduces and grows quickly, to serve as the raw material and preparing it to a diameter of 0.04 mm to 0.5 mm and length greater than 10 mm.

At present, nations around the world have been increasingly focused on protecting human survival and the environment; in particular, restrictions have been placed on the cutting of forests and greatly reduced supplies of lumber; as the population increases over time, the demand for lumber increases, the rate of lumber use increases, it becomes necessary to develop and use other resources in place of lumber resources, thus various research and development projects are attempted and expanded. For example, particle board, rough particle board, micro-particle board, fiberboards formed from agricultural-stalk crops, organic polymer materials, metals and other products are already being used in the construction industry, the furniture manufacturing industry, the packing materials industry and other industries. Bamboo is an important industrial resource widely used to produce household furniture, construction materials, artistic and decorative products, and everyday implements; however although more-extensive development is still under study. It is currently used as a construction material and processed into bamboo pressed board. The use of bamboo fiber as a basic raw material and the technology to produce bamboo fiberboard material as a replacement for lumber is already basically mature. However, extraction of bamboo fiber is still in the early stages and current methods using chemicals result in the manufacture of fine bamboo fibers that contain chemical manufacturing agents, which are bad for the environment.

The objective of the present invention lies in that it supplies a pure and natural crude bamboo having of diameter of 0.04 mm to 0.5 mm and length greater than 10 mm and not containing chemical manufacturing agents to be used as a construction raw material, and the preparation method thereof.

The objective of the present invention is implemented using the technical formula described below: a bamboo fiber characterized in that the bamboo fibers have a diameter of 0.04 mm to 0.5 mm and length greater than 10 mm; the preparation method thereof: in sequence the bamboo raw materials are formed in a preliminary industrial process comprising an industrial process for bamboo fiber preparation, an industrial finishing process for bamboo fiber, characterized in that the bamboo fiber preparation is sequentially a industrial process composed of cold roll compacting, water boiling and soaking, dehydration, and carding of bamboo fibers. The raw material preprocessing industrial process comprises the industrial process for removing the plant branches and nodes, as well as the tapered ends, selection of material, and setting the lengths of all materials, the bamboo splint industrial process for cutting the thick bamboo culms to produce bamboo splints, and the inner layer removal industrial process for removing the bamboo nodes and removing the inner layer of dead bamboo from the bamboo splints. The cold roll compacting industrial process uses a cold rolling mill to perform cold roll compacting of the bamboo splints to produce thin bamboo splints with the water removed; the water boiling and soaking industrial process takes the thin bamboo splints produced after cold rolling and compacting, boils and soaks them in $100^{\circ}\text{C} \pm 5^{\circ}\text{C}$ water for at least 20 min, to remove sugar and fat, and to sterilize processing of the thin bamboo splints into bamboo fiber; the industrial dehydration process takes the bamboo fiber after it has been soaked and uses machines to dehydrate and dry; the industrial process for carding of bamboo fiber uses a fiber-destruction machine, employing carding to prepare the bamboo fiber as bamboo fiber threads; industrial finishing process for the bamboo fiber comprises the industrial drying process, the industrial filtering process and the industrial testing process; the drying industrial process dries the carded bamboo fibers to have a moisture content lower than 10%; the filtering industrial process removes short fibers and bamboo dust from the bamboo fiber threads after filtering and drying, to enable the finished bamboo fiber thread content to achieve a pass rate of 92% or higher.

The advantages of the present invention lie in that 1) because it uses puncture-vine bamboo, decorative bamboo and other clump bamboo as the raw materials, it makes effective appropriate rational use of the reproduction characteristics of clump bamboo and has a positive impact on environmental protection; 2) using bamboo fiber as the basic raw material and adding suitable quantities of binding agent, filler, and fire-resistant additive, it is possible to manufacture bamboo fiberboard and products thereof that can replace lumber and its products; 3) this manufacturing technique is a purely physical technique, the bamboo fiber does not contain chemical manufacturing agents and thus the bamboo fiber and its products do not pollute the environment; 4) the technique in the present invention is simple, manufacturing costs are low, and promotion is easy.

The fiber preparation technique workflow diagram for the bamboo provided by the present invention. The specific contents of the various manufacturing techniques in the diagram are as follows:

(1) The industrial process for all materials: Remove the nodes and branches and remove the tapered ends from the raw material bamboo, saw bamboo portions greater than 4 mm into fixed-length bamboo culms;

(2) Bamboo splint industrial process: Use striking or hand processing to cut the thick bamboo culms into bamboo splints of a selected size;

(3) Industrial process for removing the inner layer: Remove nodes inside the bamboo and the inner layer of bamboo splints with lower fiber content;

(4) Cold roll compacting industrial process: Use cold roll compacting to form the bamboo splints into thin bamboo splints with the water removed;

(5) Water boiling and soaking industrial process: After cold roll compacting, the thin bamboo splints are boiled and soaked in $100^{\circ}\text{C} \pm 5^{\circ}\text{C}$ water to perform sugar removal, fat removal, and sterilization for a period of no less than 20 min, to convert to bamboo fiber;

(6) Industrial dehydration process: After boiling and soaking, the bamboo fiber is dehydrated and dried by machine;

(7) Industrial process for carding of the bamboo fiber: Fiber-destruction machinery is used to card the bamboo fiber into bamboo fiber threads;

(8) Industrial drying process: Bamboo fiber threads are dried to a moisture level lower than 10%;

(9) Filtering industrial process: The dried bamboo fiber threads are filtered by removing the short bamboo fibers and the bamboo dust, creating bamboo fiber threads having a diameter of 0.04 mm to 0.5 mm, length greater than 10 mm, comprising total weight of 92%; after passing tests they are packaged, i.e., presented as industrial bamboo fiber products. Using the bamboo fiber in the present invention as the basic raw material, a suitable quantity of binding agent, filling material, and fire-resistant additives are added and other manufacturing steps performed to create bamboo fiberboard material and its products, said products can replace wooden boards and products prepared therefrom. Processing techniques used are similar to lumber processing methods; however, compared to lumber, the prepared products have superior mechanical strength and performance; high weather resistance, temperature tolerance, less moisture-induced deformation, low production costs, and heat compression formation is also possible. Bamboo fibers can also be used to make filtering, sound-absorbing, and insulating materials. Bamboo fiber products have extensive uses in construction, furniture, packaging and other industries. Because the present invention uses clump bamboo as its raw material, it effectively utilizes the reproductive characteristics of clump bamboo in terms of harvesting, and thus plays an important and positive role in protecting the environment.

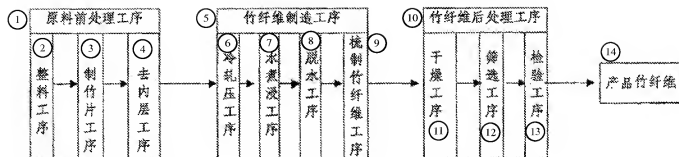


Figure 1

- Key:
- 1 Industrial process for raw material preprocessing
 - 2 Industrial process for all materials
 - 3 Industrial process for the preparation of bamboo splints
 - 4 Industrial process for removing the inner layer
 - 5 Industrial process for bamboo fiber preparation
 - 6 Industrial process for cold roll compacting
 - 7 Industrial process for water boiling and soaking
 - 8 Industrial process for dehydration
 - 9 Industrial process for carding of bamboo fiber
 - 10 Industrial process for bamboo fiber post-processing
 - 11 Industrial process for drying
 - 12 Industrial process for filtering
 - 13 Industrial process for testing
 - 14 Bamboo fiber product